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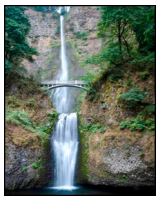

Would it be better to not talk about climate change? The impact of climate change and air pollution frames on support for regulating power plant emissions☆

P. Sol Hart[a,*], Lauren Feldman[b]

[a] University of Michigan, Ann Arbor, USA
[b] Rutgers University, USA

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ABSTRACT

This study examined how utilizing different frames to contextualize negative impacts of power plant emissions influenced belief in those impacts and support for policies to regulate emissions. Using a U.S. national YouGov sample (n = 1000), we examined how discussing emissions in terms of climate change or air pollution, and in terms of health or environmental impacts, influenced individuals with different partisan affiliations. The analysis utilized a moderated-mediation model, with belief in negative impacts of power plant emissions as the mediator, support for government action as the dependent variable, and political party as a moderator of the link from the message frame to belief. This analysis revealed that using a climate change frame relative to an air pollution frame lowered policy support both directly and indirectly via belief in negative impacts, with the strongest indirect effect observed for Republicans. There were no effects of discussing environmental versus health impacts. The results suggest that communicators may be more successful in increasing support for mitigating carbon pollution from power plants by focusing on non-climate change oriented risks that the pollution poses, rather than linking the pollution to climate change.

Climate change poses a significant threat to humans, animals, and the environment (Thomas et al., 2004; Wheeler & Braun, 2013). Despite this threat, political action to address the issue in the United States has been limited (McCright & Dunlap, 2003; Nisbet, 2009). One reason for this inaction is that climate change is now a highly polarizing issue, with Republican politicians and citizens relatively skeptical that the earth is warming due to human activity, that climate change will cause severe adverse impacts, and that regulations such as restrictions on power plant emissions can play a significant role in addressing climate change (Funk & Kennedy, 2016; Garrett, 2017). A substantial amount of research has investigated how different ways of framing climate change messages may overcome this partisan divide (Garrett, 2017; Nisbet, 2009), but proposed framing strategies have had mixed results in the literature (Bernauer & McGrath, 2016) and limited effectiveness in driving climate policy forward.

While Republicans remain skeptical about climate change, many support policies that may help address climate change, such as increasing solar and wind power and regulating carbon dioxide (Funk & Kennedy, 2016; Mildenberger, Marlon, Howe, & Leiserowitz, 2017). Thus, some communication research has shifted from a focus on how to frame climate change to a focus on how to frame potential solutions to help address climate change, with an emphasis on whether or not it is beneficial to discuss solutions in a climate change context. Recent research has suggested that efforts to build support for policy initiatives may be more successful by avoiding the polarizing context of climate change, and instead focusing on co-risks of sources of climate change pollution (Petrovic, Madrigano, & Zaval, 2014; Walker, Kurz, & Russel, 2017). For example, one might talk about the negative impacts of air pollution caused by power plants, independent of climate change, and the need to regulate emissions to address these risks (e.g. to improve human health directly rather than to mitigate climate change). Recent research has also suggested that focusing on health rather than environmental considerations may help attenuate polarization and build support for policy initiatives across the political spectrum (Maibach, Roser-Renouf, & Leiserowitz, 2008; Myers, Nisbet, Maibach, & Leiserowitz, 2012; Petrovic et al., 2014). While some studies in these areas offer promising results, others have mixed findings (Carrico, Truelove, Vandenbergh, & Dana, 2015; Hart & Nisbet, 2012), indicating

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* Corresponding author. Communication Studies, University of Michigan, 5417 North Quad, 105 S. State St, Ann Arbor, MI, 48109, USA.
E-mail address: solhart@umich.edu (P.S. Hart).

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a need for additional research.

The present study enters this contested research area to investigate how support for regulating power plant emissions may be impacted by message frames that focus on climate change or air pollution as well as environmental or health impacts. The study avoids confounds that exist in some previous work and offers a novel moderated-mediation model that examines how belief in the negative impacts of power plant emissions may be impacted by how those impacts are discussed, how this relationship may be conditional on political party affiliation, and how belief, in turn, may be associated with support for government policy to regulate and limit power plant emissions. Overall, we found that discussing negative impacts of power plant emissions in the context of climate change reduced support for government policy both directly and indirectly by weakening the belief that power plants were causing negative impacts. The indirect effect was largest for Republicans.

1. Literature review

Climate change has increasingly become a polarizing issue in America. Whereas in the late 1980s there were minimal differences in concern about the issue between Democrats and Republicans, by the early 2000s a significant gap had manifested, and this gap has both persisted and widened (Dunlap & McCright, 2008). This polarization has not been restricted to public opinion, but has also been exemplified, and potentially driven, by elected representatives (McCright & Dunlap, 2011). These conflicts have influenced U.S. engagement in international climate change treaties (McCright & Dunlap, 2003) as well as other legislation aimed at regulating or restricting carbon emissions (Fisher, Waggle, & Leifeld, 2013). As public opinion and political expression have polarized around global warming, climate change beliefs have become integral to strong partisans' core political identity (M. C. Nisbet, 2009); as a result, altering beliefs about climate change is often seen as a potential identity threat (Garrett, 2017).

The result of the politicization and polarization of climate change is that not only are Americans divided on the issue, they also are likely to engage in motivated reasoning (Taber & Lodge, 2006) when considering new information about climate change (Garrett, 2017). That is, if individuals are exposed to information that is not aligned with beliefs they already hold, they are likely to enact a host of strategies to counter-argue, including attacking the source of the information, dismissing the evidence offered, and avoiding the counter-attitudinal information (Byrne & Hart, 2009; Hart & Nisbet, 2012).

In light of this polarization, advocates and scholars have increasingly examined how messages might be strategically framed to be more acceptable and persuasive with skeptical audiences (M. C. Nisbet, 2009; M. C. Nisbet & Mooney, 2007). The term “framing” has been adopted across multiple disciplines, which has led to various approaches for understanding and investigating what it means to “frame” an issue (Benford & Snow, 2000; Chong & Druckman, 2007; Gamson & Modigliani, 1989). In the present article, we utilize an emphasis frame approach (Chong & Druckman, 2007), which examines how focusing on different aspects of an issue such as climate change can shift the interpretive lens that is used to make sense of the issue. This differs from other approaches, such as equivalency framing (Tversky & Kahneman, 1981), which looks at alternative ways of talking about an issue that are logically equivalent. In the context of climate change, scholars have investigated multiple aspects of framing. This has included visual imagery (Feldman & Hart, 2017; Hart & Feldman, 2016; O'Neill & Nicholson-Cole, 2009; O'Neill, 2013), attribution of responsibility (Jang, 2013), and thematic representation (Myers et al., 2012; E. C. Nisbet, Hart, Myers, & Ellithorpe, 2013; M. C. Nisbet, 2009), among other approaches. While some scholars suggest that reframing climate change can be effective in building public support (Bain, Hornsey, Bongiorno, & Jeffries, 2012), others have found null results (Bernauer & McGrath, 2016; E. C. Nisbet et al., 2013).

Recently, scholars have begun to investigate how reframing solutions to address climate change, rather than reframing the issue of climate change itself, may impact public support for policy interventions. For many sources of carbon emissions, such as power plants, regulating and reducing the emissions have myriad benefits beyond mitigating climate change. For example, power plant emissions can include mercury, dioxins, sulfur dioxide, and particulate matter that can have adverse consequences for human health (Fthenakis, Lipfert, Moskowitz, & Saroff, 1995; Gaffney & Marley, 2009; Silva & Boit, 2011; Zhang & Smith, 2007). A campaign to limit power plant emissions might choose to focus on health risks driven by air pollution rather than climate change, and such a strategic approach may be more palatable for individuals who are skeptical about climate change, but open to messages about regulating emissions sources to protect human health (Maibach et al., 2008; M. C. Nisbet, 2009). In other words, especially for Republicans who have shown moderate support for policies to support solar power, wind power, and regulating carbon dioxide, but remain deeply skeptical of climate change (Funk & Kennedy, 2016), discussing policy initiatives in terms of climate change may serve as an identity cue (Garrett, 2017; M. C. Nisbet, 2009) that could lower policy support.

Investigations into the effects of focusing on co-benefits of regulatory efforts have adopted a variety of approaches that often compare the impact of providing climate change information with a co-benefit strategy that does not mention climate change (Lockwood, 2011). The results of these studies have been mixed (Walker et al., 2017). For example, Petrovic et al. (2014) found that health focused frames were more effective than climate change focused frames in generating concern about the issue for moderate and conservative audiences. Somewhat similarly, Feldman and Hart (2018) found that the use of a climate change frame, compared to an air pollution or energy independence frame, lowered support for specific low-carbon energy policies among Republicans, with no framing effect for Independents or Democrats. Mossler, Bostrom, Kelly, Crosman, and Moy (2017) also found that an air pollution frame built more support for climate mitigation policy than alternative frames such as carbon pollution or climate change. On the other hand, Spence, Leygue, Bedwell, and O’Malley (2014) found that climate change focused frames were more effective in increasing behavioral predispositions to increase personal energy conservation, and Carrico et al. (2015) found mixed results for the effect of climate change focused frames on support for mitigation. These conflicting findings point to the need to better understand how alternative framing approaches may influence attitudes and behaviors, as well as the role of moderating factors such as political party affiliation and mediators such as belief in the risks posed by power plant emissions.

In the present study, we focus on how discussing power plant emissions with different frames may alter support for limiting and regulating emissions. A series of studies conducted by Petrovic et al. (2014) offers an important precursor to our research. Petrovic et al. examined whether discussing risks from power plants in terms of climate change or human health would be most effective in promoting concern and policy support. In their first framing study, Petrovic et al. found that even if climate change was not mentioned, discussing air pollution in terms of fossil fuels still seemed to trigger political polarization, likely due to the close associations that individuals have between fossil fuels and climate change.

In light of this preliminary finding, in Petrovic et al.’s (2014) second framing study, the researchers removed mentions of fossil fuels, and they instead compared a condition stating that “air pollution contains gases and particulates that are harmful to human health, and will lead to many premature deaths” (health frame) to a condition stating that “air pollution contains gases and particulates that contribute to climate change, and will lead to negative environmental consequences” (climate frame). They found an interaction with political ideology, such that conservatives were more likely to agree with the statement focusing on health impacts than the statement focusing on climate impacts, and the reverse was true for liberals (although the difference was

smaller). A similar pattern of results was found when asking about support for national policies to address air pollution.

The present study builds from the Petrovic et al. (2014) study in several important ways. First, rather than using MTurk – whose samples tends to under-represent Republicans (Levay, Freese, & Druckman, 2016) and, in some cases, may not produce replicable results (Krupnikov & Levine, 2014) – the present study uses YouGov to experimentally test messages with a national sample. Second, the present study addresses a potential confound in the Petrovic et al. study – when Petrovic et al. compared health impact information to climate change information, the health frame discussed the impact on human health, whereas the climate change frame discussed negative environmental consequences. Thus, it is not possible to disambiguate whether observed differences were due to the inclusion of climate change in the climate frame, or due to the contrast of health impacts in the health frame to environmental impacts in the climate frame. Recent research has identified public health, in particular, as a shared value that might help climate change resonate across the political spectrum (Maibach et al., 2008; Myers et al., 2012), whereas recent polling research has found polarization among the American public on environmental issues in general (Dunlap, McCright, & Yarosh, 2016), in addition to climate change specifically. It is thus important to assess how these two factors (climate change vs. air pollution, and health impacts vs. environmental impacts) may contribute to differences in opinion across the political spectrum. To address this, we conduct a fully crossed 2×2 experimental design utilizing both of these factors.

Finally, research in this area has not examined how discussing negative impacts of power plant emissions in the context of climate change or not may impact belief in whether those impacts are occurring. Such beliefs may play an important role in determining policy support. Recent work proposing a gateway belief model (Linden, Leiserowitz, Feinberg, & Maibach, 2015) suggests that if individuals believe in critical aspects of a science issue, that belief can promote support for mitigation policies. In a similar fashion, the belief that power plants are causing negative impacts may also increase support for policies to regulate and reduce power plant emissions. Thus, in the present study we examine how the psychological mechanism of belief in the negative impacts of power plants may mediate the relationship between information exposure and policy support. As climate change is a politically polarizing issue and Petrovic et al. (2014) found significant interactions with political orientation, we also examine how this mediation model may be moderated by political party affiliation.

Taken together, our hypotheses are as follows:

H1. Political party will moderate the influence of using a *climate change* frame, as compared to an *air pollution* frame, such that framing effects will be strongest among Republicans. Specifically, we expect that Republicans will have less support for government action (*H*1a) and a lower belief in the negative impacts of power plant emissions (*H*1b) when exposed to the climate change frame.

H2. Political party will moderate the influence of using an *environment* frame, as compared to a *public health* frame, such that framing effects will be strongest among Republicans. Specifically, we expect that Republicans will have less support for government action (*H*2a) and a lower belief in the negative impacts of power plant emissions (*H*2b) when exposed to the environment frame.

H3. A stronger belief in the negative impacts of power plant emissions will be positively associated with support for government action to regulate and reduce emissions.

H4. There will be a conditional indirect effect, such that the framing of power plant emissions will influence support for government action through the mediator of belief, and the links between frame exposure and belief will be moderated by political party affiliation.

2. Method

An online experiment was fielded in 2017 through YouGov using a U.S. national sample of 1000 adults, which YouGov generated using a sample matching procedure that approximates a random sample. YouGov hosted the online experiment and recruited all participants; demographics of participants are described in the control variables section (2.2.6) below.

The study utilized a 2 (*General negative impact of power plants*: air pollution or climate change) x 2 (*Specific impact:* human health or the environment) fully crossed factorial experimental design, with all manipulations and measurement adopting a between-subjects procedure.

2.1. Procedure and stimuli

After consenting to participate in the experiment, participants were randomly assigned to one of 4 conditions, with 250 participants in each condition. These conditions were based on a fully crossed design of whether power plant emissions cause a) climate change or b) air pollution (factor 1, hereafter referred to as the climate change factor), and then whether climate change or air pollution has a negative impact on a) the environment or b) human health (factor 2, hereafter referred to as the environment factor). Participants were not given detailed information about the issue; rather, the difference in conditions arose through the specific language used in the respective prompts, as described in the variables section.

2.2. Variables

2.2.1. Experimental manipulation

As mentioned in 2.1, participants were assigned to one of four conditions: a) climate change and human health, b) climate change and the environment, c) air pollution and human health, or d) air pollution and the environment. All participants were exposed to a statement which was manipulated depending on the condition the individual was assigned to. The statement read (with the manipulation in brackets): "Emissions from power plants cause [air pollution/climate change]. [Air pollution/Climate change] is very harmful to [human health/the environment]."

2.2.2. Belief in negative impacts of power plants

After viewing the statement associated with their assigned experimental condition, as described in 2.2.1, participants were asked "How much do you agree or disagree with the statement above?" Responses were given on a seven-point scale that ranged from strongly disagree (1) to strongly agree (7) ($M = 5.22$, $SD = 1.99$). This variable will be referred to as belief.

2.2.3. Belief in components of the negative impact statement

While the statement in 2.2.1 includes a logical progression of how an individual might think of negative impacts of power plants through a general phenomenon (air pollution or climate change) causing specific impacts (on human health or the environment), the question does not allow us to disambiguate whether the first or second part of the statement may be differentially influencing agreement. Thus, after participants indicated their agreement with the statement from 2.2.1, they were then asked about their agreement with each component of the original statement separately, which varied based on their original assigned condition: 1) "Power plant emissions contribute to [air pollution/climate change]"; and 2) [Air pollution/Climate change] contributes to [health/environmental] problems." Participants were asked the same prompt as 2.2.2 – "How much do you agree or disagree with the statement above?" – and answered using the same agreement scale, with respective means and standard deviations of (1: $M = 5.47$, $SD = 1.78$; 2: $M = 5.67$, $SD = 1.69$). For comparison purposes, the indirect effects using these alternative belief measures are reported in

the results section (3) below.

2.2.4. Support for government action

Participants indicated their level of support or opposition for two potential actions: 1) federal restrictions on power plant emissions; and 2) government policies and regulations that decrease power plant emissions. Each of these questions was measured on a 7-point scale that ranged from strongly oppose (1) to strongly support (7). In addition, participants were asked if they thought the U.S. government was doing far too much or far too little to limit power plant emissions. This was measured on a 5-point scale that ranged from far too much (1) to far too little (5) (with a center point of about the right amount); the measure was then normalized to a 7-point scale using a 1.5*X-0.5 modification. These three items were then combined to create an overall mean scale of support for government action (Cronbach's $\alpha = 0.83$; M = 5.14, SD = 1.68).

2.2.5. Political party

Political party was measured by having participants place themselves on a 7-point scale that ranged from Strong Democrat (1) to Strong Republican (7) with a midpoint of Independent (4), and an additional option to state that one was unsure; participants who stated they were unsure (n = 44) were not included in the analysis (M = 3.66, SD = 2.11). Political party did not have a linear relationship with the mediator; so, responses to the 7-point political party measure were grouped together to form a 3-level categorical political party variable, which consisted of Democrats (1–3 on the 7-point scale, n = 454), Independents (4 on the 7-point scale, n = 189), and Republicans (5–7 on the 7-point scale, n = 313). The categorical variable was used for the analysis.

2.2.6. Control variables

The model used in the analysis controlled for the following additional variables: gender (53% female), age (M = 47.32, SD = 17.22), and education (6-point scale, ranging from No High School (1) to Post-Graduate (6); Median = 3 (Some College), M = 3.31, SD = 1.46). There were no significant differences between conditions for these control variables; in addition, while these variables were controlled for in the analyses, the pattern of results did not differ if these variables were not controlled for.

3. Results

See Table 1 for the means of belief and support for government action by condition.

We first used an ANCOVA to investigate the main and interactive effects of the experimental factors of 1) climate change vs. air pollution (climate change factor), 2) environment vs. human health (environment factor), and 3) political party on support for government action and belief in negative impacts of power plants, respectively, while controlling for gender, age, and education. The belief scale from 2.2.2 was used for the main analyses reported below. The results for the indirect effects are then compared with the belief scales from 2.2.3 at the end of the results section. For the ANCOVA results, the main effects are from a model in which only the main effects were entered, the two-way interactions are from a model in which all main effects and two-way interactions were entered, and the three-way interaction is from a model in which all main effects, two-way interactions, and the three-way interaction were entered.

Looking first to the main effects on support for government action, we found that stating that power plants caused climate change (adj $M = 4.87$) as opposed to air pollution (adj $M = 5.07$) lowered support for government action [$F(1, 948) = 4.79$, $p = .029$, partial $\eta^2 = 0.005$]. There was no significant effect of stating that power plant emissions negatively impacted the environment (adj $M = 4.95$) compared to human health (adj $M = 5.00$) [$F(1, 948) = 0.25$, $p = .62$, partial $\eta^2 = 0.0003$]. There was a significant main effect for political party [$F(2, 948) = 168.90$, $p < .001$; partial $\eta^2 = 0.26$], such that Republicans (adj $M = 4.09$) had significantly less support for government action than Independents (adj $M = 4.84$; Sidak $p < .001$) and Democrats (adj $M = 5.99$; Sidak $p < .001$), and Independents had significantly less support than Democrats (Sidak $p < .001$).

Looking to interactive effects on support for government action, two-way interactions between the climate change factor and environment factor [$F(1, 943) = 2.92$, $p = .09$, partial $\eta^2 = 0.003$], the climate change factor and political party [$F(2, 943) = 0.76$, $p = .47$, partial $\eta^2 = 0.002$], and the environment factor and political party [$F(2, 943) = 1.03$, $p = .36$, partial $\eta^2 = 0.002$] were not significant, failing to support $H1$a and $H2$a. In addition, the three-way interaction between the climate change factor, the environment factor, and political party was not significant [$F(2, 941) = 2.66$, $p = .07$, partial $\eta^2 = 0.006$].

Looking next to effects on belief, there was a similar pattern of main effects as was found with support for government action. Stating that power plants caused climate change (adj $M = 4.74$) as opposed to air pollution (adj $M = 5.44$) lowered belief [$F(1, 948) = 33.68$, $p < .001$, partial $\eta^2 = 0.03$]. There was no significant effect of stating that power plant emissions negatively impacted the environment (adj $M = 5.12$) compared to human health (adj $M = 5.06$) [$F(1, 948) = 0.22$, $p = .64$, partial $\eta^2 = 0.0002$]. There was a significant main effect for political party [$F(2, 948) = 55.58$ $p < .001$; partial $\eta^2 = 0.11$], such that Republicans (adj $M = 4.42$) had significantly lower levels of belief than Independents (adj $M = 5.01$; Sidak $p = .002$) and Democrats (adj $M = 5.84$; Sidak $p < .001$), and Independents had significantly lower levels of belief than Democrats (Sidak $p < .001$).

Looking to interactive effects on belief, there was a significant interaction between the climate change factor and political party [$F(2, 943) = 9.39$, $p < .001$, partial $\eta^2 = 0.02$], such that the difference in the effect of the climate change vs. air pollution frame was larger for Republicans than for Independents and Democrats, in support of $H1$b (see Fig. 1). There was not a significant interaction between the climate change factor and the environment factor [$F(1, 943) = 0.13$, $p = .72$,

Table 1
Means of Variables by Condition (Standard Deviations are in Parentheses).

	Condition			
	Climate Change, Environment	Climate Change, Health	Air Pollution, Environment	Air Pollution, Health
Belief	4.82 (2.20)	4.94 (2.06)	5.55 (1.88)	5.53 (1.80)
Support for Government Action	4.98 (1.83)	5.15 (1.68)	5.34 (1.53)	5.10 (1.65)
N	233	241	240	242

Note: Means and *N* are after removing participants who stated "don't know" for political party.
"Belief" refers to belief in the negative impacts of power plant emissions.

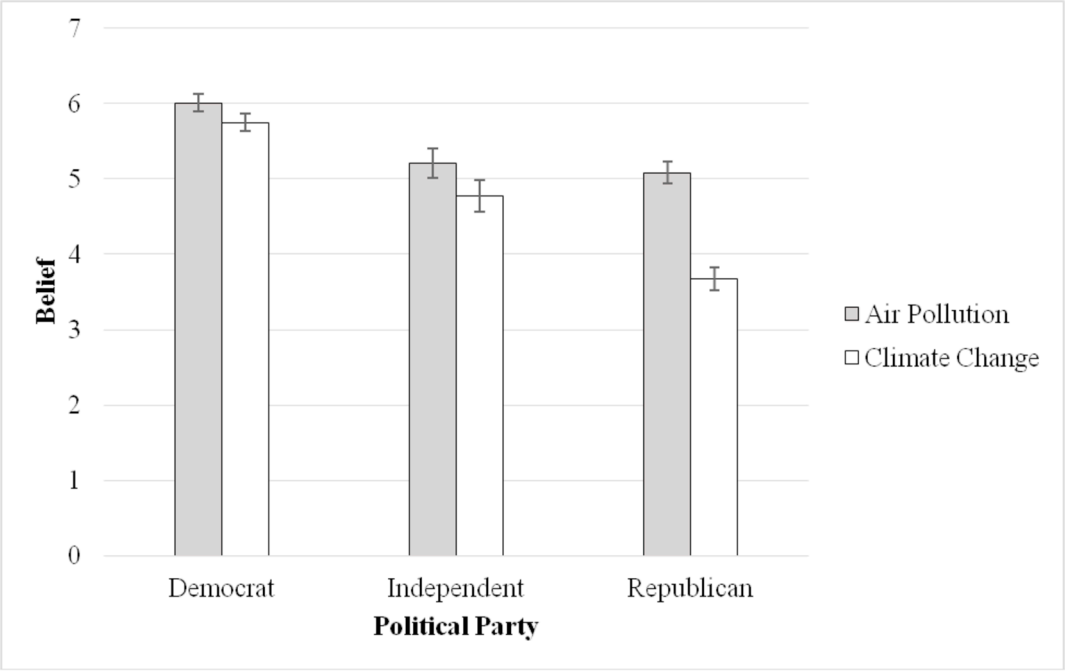

Fig. 1. Political party by the climate change factor on belief.
Note. Error bars represent the standard error of the mean.
"Belief" refers to belief in the negative impacts of power plant emissions.

Table 2
OLS Regressions on Belief (Mediator) and Policy Support (Ultimate Dependent Variable) used for Moderated-Mediation Analysis.

	Outcome	
	Belief	Policy Support
Gender (Female)	.42 (.12)***	.26 (.09)**
Education	.14 (.04)***	.06 (.03)*
Age	-.004 (004)	-.002 (.002)
Climate Change (vs. Air Pollution)	−1.43 (.21)***	.15 (.09)
Environment (vs. Health)	.04 (.12)	-.05 (.09)
Democrat	.87 (.19)***	–
Independent	.14 (.23)	–
Climate Change by Democrat	1.14 (.27)***	–
Climate Change by Independent	.96 (.34)**	–
Belief	–	.46 (.02)***
Constant	4.19 (.33)***	2.17 (.26)
r^2	0.18	0.32
N	956	956

Note. Unstandardized coefficients are reported.
Democrat and Independent were dummy coded with Republican as the reference group.
"Belief" refers to belief in the negative impacts of power plant emissions.
The significant interactions of Climate Change by Democrat and Climate Change by Independent may be interpreted as: the climate change frame had less of a negative impact on belief for Democrats and Independents than for Republicans.
***p < .001; **p < .01; *p < .05.

partial $\eta^2 = 0.0001$] or the environment factor and political party [F (2, 943) = 0.004, p = .99, partial $\eta^2 = 0.000008$], failing to support *H*2b. There was also not a significant three-way interaction between the climate factor, environment factor, and political party [F (2, 941) = 1.26, p = .28, partial $\eta^2 = 0.003$].

An OLS regression also revealed a significant positive association between belief and policy support (unstandardized b = 0.46, p < .001), in support of *H*3 (see Table 2, column 2).

After looking at direct effects, we then examined whether there was an indirect effect from the experimental conditions, through belief, on support for government action, with moderation by political party. We utilized our preliminary analysis to design our moderated-mediation model; in our initial analysis, we did not find evidence of a main or interactive effect from the environment factor but did find that political party moderated the effect of the climate change factor on belief. In light of this, we analyzed a moderated-mediation model that used the climate change factor as the initial independent variable, belief in negative impacts as the mediator, support for government action as the dependent variable, and political party as a moderator of the link from the climate change factor to belief (see Fig. 2 for a diagram of this model). While the environment factor did not influence our mediator or dependent variable in our preliminary analysis, we still wanted to control for any potential effects for individuals assigned to this exposure condition; thus, we retained the environment factor as a control variable in the model (we also ran the model without controlling for the environment factor and did not see any difference in the pattern of results). We analyzed the proposed model using PROCESS model 9 (with Democrat and Independent party affiliation serving as moderating dummy variables, making Republican party affiliation the reference group) in PROCESS version 2.16.3.

PROCESS uses a path analytic framework based on OLS regression and bootstraps observed indirect effects, which is considered a superior approach to causal steps or the Sobel test for mediation (Hayes, 2013). All reported indirect effects used 10,000 bootstrap iterations and bias-corrected confidence intervals. See Table 2 for results of all direct effects in the moderated-mediation model.

Before testing for conditional indirect effects, we examined the unmoderated indirect effect of the climate change frame while controlling for political party using PROCESS model 4, and found that the climate change frame, as compared to the air pollution frame, lowered policy support through the mediator of belief (point estimate (PE) = −0.25, lower level confidence interval (LLCI) = −0.35, upper level confidence interval (ULCI) = −0.16).

Looking to the conditional indirect effects of the climate change frame through belief onto policy support, with political party moderating the link between the climate change frame and belief (see Fig. 2), the index of partial moderated mediation, which tests the equality of

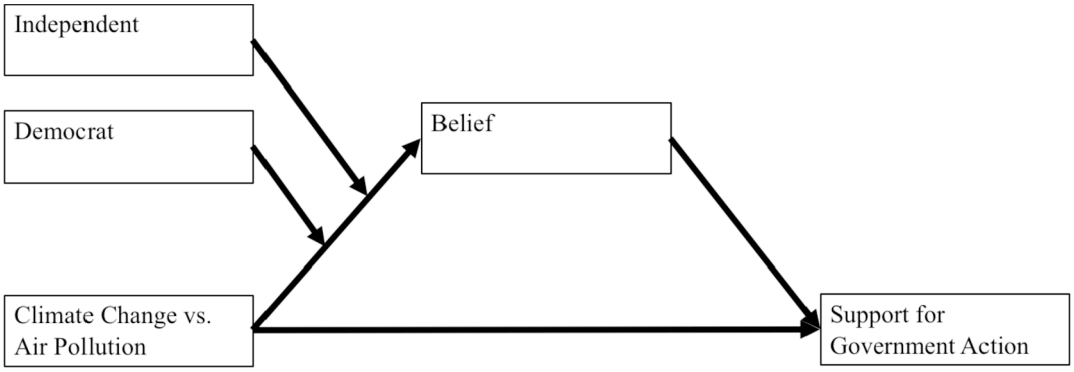

Fig. 2. Moderated-mediation model for testing.
Note. Democrat and Independent were dummy coded with Republican as the reference group. Control variables of Gender, Education, and Age are not visually displayed in Fig. 2, but were used in the analyses.
"Belief" refers to belief in the negative impacts of power plant emissions.

the conditional indirect effects in the dummy coded groups, was significant for Democrats (Index (I) = 0.52, LLCI = 0.28, ULCI = 0.78) and Independents (I = 0.44, LLCI = 0.13, ULCI = 0.76), using Republicans as the reference group, in support of *H*4. For Republicans, the indirect effect was such that using the climate change frame led to less support for government action (PE = −0.65, LLCI = −0.87, ULCI = −0.45). There was not a significant indirect effect for Independents (PE = −0.21, LLCI = −0.49, ULCI = 0.05) or Democrats (PE = −0.13, LLCI = −0.28, ULCI = 0.02).

As mentioned previously, we recognize that our primary belief measure described in 2.2.2 examines belief in a two-part statement. Therefore, we also investigated the conditional indirect effects for the belief variables described in 2.2.3, which examine each part of the statement separately; this additional analysis revealed similar results. When we examined the moderated-mediation model using the mediator of belief in the first alternative impact statement (power plant emissions contribute to [air pollution/climate change]), the index of partial moderated mediation was significant for Democrats (I = 0.62, LLCI = 0.31, ULCI = 0.94) but not for Independents (I = 0.16, LLCI = −0.26, ULCI = 0.59), using Republicans as the reference group. There was a significant negative indirect effect of using the climate change frame for Republicans (PE = −0.74, LLCI = −1.02, ULCI = −0.47) and Independents (PE = −0.59, LLCI = −0.95, ULCI = −0.25), but not for Democrats (PE = −0.13, LLCI = −0.29, ULCI = 0.03). When we examined the model using the mediator of belief in the second alternative impact statement ([climate change/air pollution] contribute to [environmental/health] problems), the index of partial moderated mediation was significant for Democrats (I = 0.55, LLCI = 0.24, ULCI = 0.85) but not for Independents (I = 0.06, LLCI = −0.36, ULCI = 0.49), using Republicans as the reference group. For the second alternative belief statement, there was a significant negative indirect effect of using the climate change frame for Republicans (PE = −0.80 LLCI = −1.08, ULCI = −0.52), Independents (PE = −0.73, LLCI = −1.07, ULCI = −0.40), and Democrats (PE = −0.25, LLCI = −0.39, ULCI = −0.11). We note that while our primary belief measure (2.2.2) did not show a significant negative indirect effect for Democrats and Independents, the point estimates were negative, in line with the pattern of results shown for the alternative belief measures. In addition, in both our primary belief measure and the two alternative belief measures, political party moderated the indirect effect such that Republicans were more sensitive to framing effects than Democrats, with Independents in between the two.

4. Discussion

The present study examined how different framing strategies affect public opinion about regulating and limiting power plant emissions. While previous work has examined how framing solutions to address climate change may influence public opinion (Carrico et al., 2015; Feldman & Hart, 2018; Petrovic et al., 2014; Walker et al., 2017), the present study is the first we are aware of to examine how belief in negative impacts from power plants may mediate a framing effect on policy support. Specifically, we tested how framing power plant emissions as causing negative human health or environmental impacts as a result of either air pollution or climate change influenced a belief in negative impacts of power plant emissions, how this effect was moderated by political party affiliation, and how belief, in turn, was associated with support for government policy.

Looking to our proposed hypotheses, we found that political party was a significant moderator of the influence of the climate change factor on belief (*H*1b) but did not moderate the direct influence of the climate change factor on policy support (*H*1a), or the influence of the environment factor on belief (*H*2b) or policy support (*H*2a). *H*3 was supported, as the belief variable had a positive association with support for government action. The overall moderated-mediation effect proposed by *H*4 was also supported. Taken together, the results demonstrate that discussing power plant emissions in terms of climate change, rather than air pollution, had an overall negative impact on policy support as well as an indirect negative influence on policy support through belief, with a larger negative indirect effect for Republicans.

It is of particular interest that mentioning environmental or human health impacts (environment factor) did not differentially impact policy support or belief. We note that in addition to there being no main effects, political party did not moderate the impact of mentioning environmental or human health impacts. This result is somewhat surprising, as environmental issues are often associated with political polarization (Dunlap et al., 2016). In addition, health framing has been proposed as a way to reduce political polarization (Myers et al., 2012; M. C.; Nisbet, 2009) (although we note that this attenuation of polarization does not always occur (Hart & Nisbet, 2012)). It is possible that there simply was not enough information in the experimental prompt to trigger an effect. We purposefully limited the length of the agreement statement after Petrovic et al. (2014) had found that small wording changes in the stimulus materials could amplify or attenuate political moderation, and we wanted to limit the potential for this to occur. It is possible that if the experiment utilized a more robust description of environmental or health impacts, as had been done in some previous work in this area (Myers et al., 2012), an interaction with political orientation would have been observed.

This lack of a significant effect of mentioning environmental versus human health impacts also has implications for Petrovic et al.'s (2014) results. As noted in the literature review, Petrovic et al.'s work included a potential confound of using health impacts in the health condition and environmental impacts in the climate change condition. The results

of the present study suggest that this potentially confounding factor may have had a minimal effect in the Petrovic et al. study, as it did not exert influence here.

Looking to the influence of the climate change frame compared to the air pollution frame on belief in the negative impacts of power plant emissions, there was a significant framing effect moderated by political party affiliation. Republicans were more likely to agree that power plants have negative impacts when the statement said that power plants were causing air pollution as compared to climate change. As belief had a strong, positive association with support for government action, these results suggest that if communicators want to increase support for regulating emissions from power plants, it may be advantageous to avoid mentioning climate change when possible. It is important to note that Democrats and Independents were supportive of policy interventions while Republicans were generally neutral; thus, our results should be seen as particularly important for strategic communicators interested in moving Republicans from a neutral stance to a more supportive stance in terms of regulating power plant emissions.

We note, looking at the overall indirect effects model, that while the climate change frame had a negative indirect effect on policy support for Republicans, it did not exert an effect for Democrats. While this stands in contrast to the results found in Petrovic et al. (2014), it does align with other work that has found Republicans to be more sensitive to framing effects around climate change than Democrats (Schuldt, Konrath, & Schwarz, 2011). We also note that while there was moderation on the indirect effect, there was not similar moderation on the overall (unmediated) main effect of the climate change frame on policy support. The lack of moderation in the overall effect may be due to an unmeasured variable that diluted or canceled out this moderation.

Strengths of the present study include a carefully controlled experimental design and use of a high quality national participant sample recruited by YouGov. Of course, it is only a single study, and caution should be taken when generalizing. In addition, while we measured policy preferences, we did not directly measure voting behavior or other ways that these preferences might directly manifest themselves. Still, public opinion can influence policy action by elected officials (Burstein, 2003), and remains an important outcome in its own right. We also note that the belief measurement utilized in the present study incorporated two belief statements that capture a logical belief sequence of impacts from power plants. As mentioned in the results section, we checked this primary belief question against two alternative belief questions and found largely similar results. Thus, we believe that the use of the belief question reported in the results section is reasonable. We also note that the effect sizes for significant effects were small (< 0.1), meaning that a single exposure to an air pollution or climate change frame is unlikely to have a large impact. However, repeated exposures to phenomena with small effect sizes can have significant societal effects (Greenwald, Banaji, & Nosek, 2015), meaning that repeated message exposure to air pollution or climate change frames can still have societally meaningful outcomes. Finally, while we looked at belief as the mediator in the present study, previous research has identified additional important mediators such as emotions (Feldman & Hart, 2017), concern (Mossler et al., 2017), and message relevance (Walker et al., 2017). Future research may expand on the present research by incorporating additional mediators such as these, as well as investigating additional substantive domains that include both polarizing and non-polarizing reasons for promoting policy action.

It is important to note that the messages used in the present study discussed sources of pollution (power plants) relevant to climate change, rather than the complex issue of climate change as a whole. Climate change has been described as a "super wicked problem" (Lazarus, 2008; Levin, Cashore, Bernstein, & Auld, 2012) that defies easy solutions. A host of communication strategies will likely be necessary in order to address climate change, including informal science learning (Geiger, Swim, Fraser, & Flinner, 2017), increasing public understanding of the issue (Ranney & Clark, 2016), and considering how communication approaches may resonate with the values that individuals hold (Feinberg & Willer, 2013).

On the face of it, the present study suggests that when discussing climate change solutions that have non-climate change related co-benefits, it may be more effective to not mention climate change, especially when communicating with Republicans. In other words, as a comprehensive plan to address climate change will be difficult to implement, targeted actions such as regulating or limiting power plant emissions can still help address the larger "wicked" issue, and messages promoting such regulation may be more readily accepted by the public when the focus is placed on non-climate change related risks. For example, in China, public outrage over air pollution has helped promote government regulations to limit emissions from coal-fired power plants, which also have benefits for reducing climate change (Zhang, Li, Hao, & Zhang, 2018). We acknowledge, however, that such an approach may serve to marginalize the larger issue of climate change and imply that climate change is not an important issue that needs to be addressed (Vezirgiannidou, 2013). And, in some contexts, with some audiences, explicitly discussing climate change can encourage public engagement (e.g., Geiger et al., 2017; Spence et al., 2014). An alternative approach may be to focus on non-climate related co-benefits of policy initiatives, while still mentioning climate change implications in a less prominent way (Walker et al., 2017). Future research may benefit by continuing to investigate how emphasizing or deemphasizing climate change when discussing climate-relevant policy initiatives may affect public support for the policy as well as public opinion about climate change as a whole.

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P. Sol Hart is an Associate Professor at the University of Michigan, Ann Arbor.

Lauren Feldman is an Associate Professor at Rutgers University.